WHAT IS CLAIMED IS:

1. A method, comprising:

disposing a precursor solution onto a surface of a layer to form a precursor film, the precursor film including a salt of a rare earth metal, a salt of an alkaline earth metal and a carboxylate salt of a transition metal, with the proviso that the carboxylate salt of the transition metal salt is not a trifluoroacetate salt of the transition metal; and

treating the precursor film to form an intermediate of a rare earth metal-alkaline earth metal-transition metal oxide.

2. The method of claim 1, wherein the precursor film is treated for less than about five hours.

3. The method of claim 1, the precursor solution further comprises a Lewis base.

4. The method of claim 3, wherein the Lewis base comprises a nitrogen-containing compound.

5. The method of claim 4, wherein the nitrogen-containing compound is selected from the group consisting of ammonia and amines.

6. The method of claim 1, wherein the layer of the intermediate has a thickness of at least about one micrometer.

7. The method of claim 1, further comprising treating the layer of the intermediate to form a layer of a rare earth metal-alkaline earth metal-transition metal oxide having a critical current density of at least about 0.5×10^6 Amperes per square centimeter.

8. The method of claim 1, wherein defects contained within the layer of the intermediate comprise less than about 20 percent of any volume element of the intermediate defined by a projection of one square centimeter of a surface of the intermediate.

9. The method of claim 1, wherein the carboxylate salt of the transition metal comprises $Cu(O_2CC_2H_5)_2$.

10. The method of claim 9, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

11. The method of claim 10, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium carboxylates and nonhalogenated yttrium carboxylates.

12. The method of claim 1, wherein the carboxylate salt of the transition metal comprises a nonhalogenated carboxylate salt.

13. The method of claim 12, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

14. The method of claim 13, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

15. A method, comprising:

disposing a precursor solution onto a surface of a layer to form a precursor film, the precursor film including a salt of a rare earth metal, a salt of an alkaline earth metal and a carboxylate salt of copper; and

treating the precursor film to form an intermediate of a rare earth metal-alkaline earth metal-transition metal oxide.

16. The method of claim 15, wherein the precursor film is treated for less than about five hours.

17. The method of claim 15, wherein the precursor solution further comprises a Lewis base.

18. The method of claim 17, wherein the Lewis base comprises a nitrogen-containing compound.

19. The method of claim 18, wherein the nitrogen-containing compound is selected from the group consisting of ammonia and amines.

20. The method of claim 15, wherein the layer of the intermediate has a thickness of at least about two micrometers.

21. The method of claim 15, wherein the layer of the intermediate has a thickness of at least about three micrometers.

22. The method of claim 15, wherein the layer of the intermediate has a thickness of at least about four micrometers.

23. The method of claim 15, wherein the layer of the intermediate has a thickness of at least about five micrometers.

24. The method of claim 15, further comprising treating the layer of the intermediate to form a layer of a rare earth metal-alkaline earth metal-transition metal oxide material having a critical current density of at least about 0.5×10^6 Amperes per square centimeter.

25. The method of claim 15, wherein defects contained within the layer of the intermediate comprise less than about 20 percent of any volume element of the intermediate defined by a projection of one square centimeter of a surface of the intermediate.

26. The method of claim 15, wherein the carboxylate salt of copper comprises $Cu(O_2CC_2H_5)_2$.

27. The method of claim 26, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

28. The method of claim 27, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

29. The method of claim 15, wherein the carboxylate salt of copper comprises a nonhalogenated carboxylate salt of copper.

30. The method of claim 29, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

31. The method of claim 30, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

32. A method, comprising:

disposing a precursor solution onto a surface of a layer to form a precursor film, the precursor film including a salt of a rare earth metal, a salt of an alkaline earth metal and a carboxylate salt of a transition metal; and

treating the precursor film to form a rare earth metal-alkaline earth metal-transition metal oxide intermediate.

33. The method of claim 32, wherein the precursor film is treated for less than about five hours.

34. The method of claim 32, wherein the precursor solution further comprises a Lewis base.

35. The method of claim 32, wherein the Lewis base comprises a nitrogen-containing compound.

36. The method of claim 32, wherein the nitrogen-containing compound is selected from the group consisting of ammonia and amines.

37. The method of claim 32, wherein the superconductor material has a critical current density of at least about $1x10^6$ Amperes per square centimeter.

38. The method of claim 32, wherein the intermediate is at least about one micrometer thick.

39. The method of claim 32, wherein the carboxylate salt of the transition metal comprises $Cu(O_2CC_2H_5)_2$.

40. The method of claim 39, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

41. The method of claim 40, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

42. The method of claim 32, wherein the carboxylate salt of the transition metal comprises a nonhalogenated carboxylate salt.

43. The method of claim 42, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

44. The method of claim 43, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

45. A composition, comprising:
a salt of a rare earth metal;
a salt of an alkaline earth metal; and
a carboxylate salt of copper.

46. The composition of claim 45, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

47. The composition of claim 46, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

48. The composition of claim 45,further comprising a Lewis base.

49. The composition of claim 48, wherein the alkaline earth metal salt comprises barium trifluoroacetate.

50. The composition of claim 49, wherein the rare earth metal salt comprises a salt selected from the group consisting of halogenated yttrium acetates and nonhalogenated yttrium acetates.

51. A method comprising:

disposing a precursor solution onto a surface of a layer to form a precursor film, the precursor film including a salt of a rare earth metal, a salt of an alkaline earth metal, a salt of a transition metal and a Lewis base; and

treating the precursor film to form an intermediate of a rare earth metal-alkaline earth metal-transition metal oxide.

52. The method of claim 51, wherein the Lewis base comprises a nitrogen-containing compound.

53. The method of claim 52, wherein the nitrogen-containing compound is selected from the group consisting of ammonia and amines.

54. The method of claim 52, wherein the nitrogen-containing compound comprises an amine having a formula selected from the group consisting of CH_3CN, C_5H_5N and $R_1R_2R_3N$, wherein each of R_1 R_2 and R_3 are independently selected from the group consisting of H, a straight chained alkyl group, a branched alkyl group, an aliphatic alkyl group, a non-aliphatic alkyl group and a substituted alkyl group.

55. The method of claim 51, wherein the layer of the intermediate has a surface adjacent the surface of the first layer and the layer of the intermediate has a plurality of volume elements, and wherein defects contained within the intermediate comprise less than about 20 percent of any volume element of the intermediate defined by a projection of one square centimeter of the surface of the intermediate, and the intermediate is free of any defect having a maximum dimension greater than about 200 micrometers.

56. The method of claim 51, wherein the precursor film is treated for less than about five hours.

57. The method of claim 51, wherein the layer of the intermediate has a surface adjacent the surface of the first layer and the layer of the intermediate has a plurality of volume elements, and wherein defects contained within the intermediate comprise less than about 10 percent of any volume element of the intermediate defined by a projection of one square centimeter of the surface of the intermediate, and the intermediate is free of any defect having a maximum dimension greater than about 200 micrometers.

58. The method of claim 51, wherein the intermediate is capable of being processed to provide a superconductor material having a critical current density of at least about $0.5x10^6$ Amperes per square centimeter.

59. A composition, comprising:

a Lewis base;

a salt of a rare earth metal;

a salt of an alkaline earth metal; and

a salt of a transition metal.

60. The composition of claim 59, wherein the Lewis base comprises a nitrogen-containing compound.

61. The composition of claim 60, wherein the nitrogen-containing compound is selected from the group consisting of ammonia and amines.

62. The composition of claim 60, wherein the nitrogen-containing compound comprises an amine having a formula selected from the group consisting of CH_3CN, C_5H_5N and $R_1R_2R_3N$, wherein each of R_1, R_2 and R_3 are independently selected from the group consisting of H, a straight chained alkyl group, a branched alkyl group, an aliphatic alkyl group, a non-aliphatic alkyl group and a substituted alkyl group.

63. The composition of claim 59, wherein the transition metal salt has a formula selected from the group consisting of M□□(CXX□X□CO(CH)$_a$CO-CX□□X□□□X□□□)(CX□□□□X□□□□X□□□□CO(CH)$_b$CO-CX□□□□□X□□□□□X□□□□□), M□□(O$_2$C-(CH$_2$)$_n$-CXX□X□)(O$_2$C-(CH$_2$)$_m$-CX□□X□□□X□□□) and M□□(OR)$_2$, wherein M□□ is the transition metal, a is an integer having a value of at least one and at most five, b is an integer having a value of at least one and at most five, n is an integer having a value of at least one and at most ten, m is an integer having a value of at least one and at most ten, R is a halogenated or nonhalogenated carbon containing group, and each of X, X□, X□□, X□□□, X□□□□, X□□□□□, X□□□□□□, X□□□□□□□, X□□□□□□□□, X□□□□□□□□□, X□□□□□□□□□□ is H, F, Cl, Br or I, with the proviso that the transition metal salt does not have the formula M□□(CF$_3$CO$_2$)$_2$.

64. The composition of claim 59, wherein the transition metal salt comprises a carboxylate salt.

65. The composition of claim 59, wherein the transition metal salt comprises $Cu(O_2CC_2H_5)_2$.

66. The method of claim 1, wherein the layer of the intermediate has a surface adjacent the surface of the first layer and the layer of the intermediate has a plurality of volume elements, and wherein defects contained within the intermediate comprise less than about 20 percent of any volume element of the intermediate defined by a projection of one square centimeter of the surface of the intermediate, and the intermediate is free of any defect having a maximum dimension greater than about 200 micrometers.

67. The method of claim 15, wherein the layer of the intermediate has a surface adjacent the surface of the first layer and the layer of the intermediate has a plurality of

volume elements, and wherein defects contained within the intermediate comprise less than about 20 percent of any volume element of the intermediate defined by a projection of one square centimeter of the surface of the intermediate, and the intermediate is free of any defect having a maximum dimension greater than about 200 micrometers.

68. The method of claim 67, wherein the intermediate is capable of being processed to form a superconductor material having a critical current density of at least about $0.5x10^6$ Amperes per square centimeter.

69. A method, comprising:

disposing a precursor solution onto a surface of a layer to form a precursor film; and

treating the precursor film to form a superconductor material having a critical current of at least about 200 Amperes per centimeter of width.

70. The method of claim 69, wherein the superconductor material has a critical current of at least about 300 Amperes per centimeter of width.

71. The method of claim 69, wherein the superconductor material has a critical current of at least about 300 Amperes per centimeter of width.

72. The method of claim 69, wherein the precursor solution comprises a salt of a rare earth metal, a salt of an alkaline earth metal and a salt of a transition metal.

73. The method of claim 72, wherein the rare earth metal is yttrium, the alkaline earth metal is barium, and the transition metal is copper.

74. The method of claim 69, wherein the superconductor material comprises a rare earth metal-alkaline earth metal-transition metal oxide.

75. The method of claim 69, wherein the superconductor material comprises YBCO.

76. The method claim 69, wherein the method includes forming an intermediate of the superconductor material.

77. The method of claim 76, wherein the intermediate is metal oxyfluoride intermediate.

78. The method of claim 1, wherein the intermediate of the rare earth metal-alkaline earth metal-transition metal is further treated to form a superconductor material has a critical current of at least about 200 Amperes per centimeter width.

79. The method of claim 15, wherein the intermediate of the rare earth metal-alkaline earth metal-transition metal is further treated to form a superconductor material has a critical current of at least about 200 Amperes per centimeter width.

80. The method of claim 32, wherein the intermediate of the rare earth metal-alkaline earth metal-transition metal is further treated to form a superconductor material has a critical current of at least about 200 Amperes per centimeter width.

81. The method of claim 51, wherein the intermediate of the rare earth metal-alkaline earth metal-transition metal is further treated to form a superconductor material has a critical current of at least about 200 Amperes per centimeter width.

82. The method of claim 1, wherein the carboxylate salt of the transition metal comprises a propionate salt of the transition metal.

83. The method of claim 15, wherein the carboxylate salt of the transition metal comprises a propionate salt of the transition metal.

84. The method of claim 32, wherein the carboxylate salt of the transition metal comprises a propionate salt of the transition metal.

85. The composition of claim 45, wherein the carboxylate salt of copper comprises a propionate salt of copper.

86. The method of claim 51, wherein the salt of the transition metal comprises a carboxylate salt of the transition metal.

87. The composition of claim 59, wherein the salt of the transition metal comprises a carboxylate salt of the transition metal.

88. The composition of claim 69, wherein the precursor solution comprises a Lewis base.